

1   **WHAT IS CLAIMED IS:**

2       1. A tunable filter with a wide free spectral range, comprising:

3       a first collimator;

4       a second collimator opposed to the first collimator; and

5       a mirror interposed between the first and second collimators, with an

6       appropriate tilt angle and a high reflectivity lens, whereby a resonance cavity is

7       defined in a space between the mirror and the second collimator.

8       2. The tunable filter as claimed in claim 1, wherein the tunable filter using a

9       heat actuator has a mirror coated with a multi-layer membrane on a concave lens

10       on opposite side of an aperture on a substrate; where the multi-layer membrane is

11       formed with alternate layers of GaAs and AlAs.

12       3. The tunable filter as claimed in claim 1, wherein the tunable filter using

13       an electrostatic actuator has a mirror coated with a multi-layer membrane on a

14       concave lens surface on opposite side of an aperture on a substrate; wherein the

15       mirror has a dielectric layer and an electrode layer formed on top of the mirror

16       forming air pockets on opposite side of the aperture on the substrate and the

17       concave lens surface of the mirror.

18       4. The tunable filter as claimed in claim 3, wherein the multi-layered

19       membrane is formed by alternate layers of GaAs and AlAs.

20       5. The tunable filter as claimed in claim 3, wherein the multi-layered

21       membrane is formed by alternate layers of  $\text{TiO}_2$  and  $\text{SiO}_2$ .

22       6. The tunable filter as claimed in claim 1, wherein the first collimator has

23       an anti-reflection coating on the lens surface.

24       7. The tunable filter as claimed in claim 1, wherein the second collimator

1 has a high reflectivity layer on the lens surface, whereby a resonance cavity is  
2 defined in the space between the concave lens of the mirror and the second  
3 collimator.

4 8. The tunable filter as claimed in claim 6, wherein the second collimator  
5 has a high reflectivity layer on lens surface, whereby a resonance cavity is  
6 defined in the space between the concave lens of the mirror and the second  
7 collimator.